

Rejection Under 35 U.S.C. §103

Claim 11 covers a pressure accumulator for dampening pulses comprising an accumulator housing 10 having a gas space 26 and a fluid space 40 therein, a piston part 28 located and movable in the housing, and a bellows-shaped separating element 30 supported at one end 32 on the piston part and at an opposite end 34 on the housing and separating the gas space and the fluid space in the housing with the piston part in a fluid-tight and a gas-tight manner. A definable volumetric portion of a working gas and a liquid fill gas space 26. The liquid in the gas space is an alcohol.

By forming the pressure accumulator in this manner, the accumulator can be made small while providing effective dampening and smoothing of pulsations in the fluid medium in and connected to fluid space 40. The liquid alcohol in the gas space reduces the volume of the gas in that space. Additionally, expansion and contraction of the fold parts are supported on and facilitated by the liquid alcohol in the gas space, increasing surface life and operating reliability of the pressure accumulator, particularly for rapid pulsations and high-speed pressure surges. This claimed structure is not disclosed or rendered obvious by any of the cited patents.

Claims 11-23 stand rejected under 35 U.S.C. §103 as being unpatentable over U.S. Patent No. 4,997,009 to Niikura in view of U.S. Patent No. 3,933,172 to Allen and U.S. Patent No. 5,031,664 to Alaze. The Niikura patent is again cited for a pressure accumulator/pulsation dampener having a housing 15, a piston 35, a bellows 17 and gas and liquid chambers that are sealed. Ports 21 and 22 are alleged to provide fluid communications in the Niikura accumulator. The Niikura accumulator allegedly has a channel formed around the piston between the piston and wall capable of holding fluid, with the piston being movably guided in the housing for a

distance into one end of the housing viewed as a cap. Niikura guide cap 55 is alleged to provide a stop preventing contact of the piston with the inside wall of the accumulator where it is attached to a cover part of the housing. The Niikura bellows is allegedly of metal with a plurality of folds. The Niikura ports 21 and 22 are allegedly connected to an antechamber inside inner cylinder 16. In the Niikura accumulator, an annular gap is allegedly provided between the gas chamber and the bellows members. The Allen is cited for disclosing an accumulator structure having a bladder, ethylene glycol in a space 46 to prevent gas from mixing with the oil in the chamber thereby forming a barrier and allegedly to place liquid in the gas space to seal the gas space. In support of the rejection, it is alleged that it would be obvious to use the Allen ethylene glycol barrier between the gas and oil chambers of the Niikura accumulator. The Alaze patent is cited for a piston accumulator comprising a piston 13 in a housing 18, a gas space 15, a fluid space 14 and a liquid 33 in the gas chamber to provide a further seal maintaining the gas and fluid spaces separate. In support of the rejection, it is alleged that it would be obvious to provide a liquid seal within the Niikura gas chamber to ensure that it does not leak, as allegedly suggested by the Alaze patent.

The Niikura patent discloses a gas chamber 45. However, nothing in the rejection demonstrates that the Niikura gas chamber has a liquid therein, particularly, an alcohol liquid, as claimed.

The Allen patent discloses an accumulator having a gas contained in an elastomer bag or bladder 44, crude oil 58 in a barrier tank 56 and a liquid 46 forming an isolating barrier between the crude oil 58 and the elastomer bladder 44 of the accumulator vessel. The barrier liquid 46 is disclosed as being ethylene glycol or some other liquid heavier than crude oil 58.

The Allen ethylene glycol liquid 46 is not within the gas space defined by the interior of bladder 44. Thus, the Allen patent, considered alone or in combination with the Niikura patent, would not disclose or render obvious to one of ordinary skill in the art the provision of an alcohol liquid within a gas space, such as the gas chamber 45 of the Niikura patent. Any obvious combination, if any exists at all, of the Niikura and Allen patents would be the provision of the ethylene glycol within the fluid or liquid chamber 41 of the Niikura communication between the inside of bellows 31 and the pump and/or hydraulic device 12.

The Alaze patent discloses a pressure reservoir having a fluid pressure reservoir chamber 14 and a gas chamber 15 separated by a divider piston 12. A fluid seal 33 is provided in gas chamber 15 to lubricate piston sealing ring 16 and to prevent escape of gas from gas chamber 15 (column 2, lines 27-33). The hollow chamber 23 of divider piston 12 also contains a certain amount of the fluid 34. As stated in column 2, lines 36-41:

The fluid is equivalent in chemical composition to the pressure fluid fed into the pressure fluid reservoir chamber 14, because due to the lubrication process, some of the fluid can get into the intervening space 35 and reach the seal 17 over the service life of the pressure fluid reservoir 1.

Thus, the Alaze patent only teaches using the same fluid as in the fluid chamber 14. Claim 11 requires a different fluid, specifically alcohol.

In summary, the Niikura patent does not have any liquid in its gas chamber. Similarly, the ethylene glycol of the barrier liquid 46 in the Allen patent is only on the side of the bladder that corresponds to the fluid space of the Niikura patent, and thus, does not disclose or teach providing its liquid in the gas space. While the Alaze patent has a liquid in its gas space that liquid 33 is to be the equivalent in chemical composition to that in chamber 14 (col. 2, lines 36-41). In this manner, the Alaze patent teaches away from the use of an alcohol which is different

from the liquid in the fluid space of the Alaze pressure fluid reservoir. It would not be obvious to use the Allen ethylene glycol for the Alaze liquid 33 in view of the different locations for the two liquids in those two accumulators. This modification of a modifying citation is an indicator of unobviousness.

Accordingly, claim 11 is patentably distinguishable over the cited patents by the liquid alcohol in the gas space, a feature not disclosed by any of the cited patent documents.

Claims 12-23, being dependent upon claim 11, are also allowable for the above reasons. Moreover, these dependent claims recite additional features further distinguishing them over the cited patents.

Claim 12 is further distinguishable by the alcohol liquid in the gas space being ethylene glycol. No such liquid is located in the gas chamber in any of the cited patents.

Claim 13 is further distinguishable by the fluid connections, in combination with the liquid alcohol in the gas space.

Claim 14 is further distinguishable by the supply of diesel fuel or heavy oil to the fluid space, in combination with the liquid alcohol in the gas space.

Claim 15 is further distinguishable by the piston cavity in combination with the liquid alcohol in the gas space.

Claim 16 is further distinguishable by the guiding of the piston part in combination with the liquid alcohol in the gas space.

Claim 17 is further distinguishable by the radial distance between the cover part portions of the housing and the piston part for flow of the liquid alcohol.

Claim 18 is further distinguishable by the stop on the piston, particularly in combination with the liquid alcohol in the gas space.

Claim 19 is further distinguishable by the stop surface on the end opposite the stop, particularly in combination with the liquid alcohol in the gas space.

Claim 20 is further distinguishable by the stop surface engaging a cover part, particularly in combination with the liquid alcohol in the gas space.

Claim 21 is further distinguishable by the metal bellows that can receive the liquid alcohol in the gas space.

Claim 22 is further distinguishable by the common antechamber within the piping, particularly in combination with the liquid alcohol in the gas space.

Claim 23 is further distinguishable by the annular gap that conveys the working gas and liquid flow to an inside surface of the separating element.

In view of the foregoing, claims 11-23 are allowable. Prompt and favorable action is solicited.

Respectfully submitted,



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